

# THE ORDERS AND CLASSES OF NEMAS\*

CONTRIBUTIONS TO A SCIENCE OF NEMATOLOGY, VIII

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Our first adequate conception of the nema phylum will come from a study of the free-living forms, for in parasitic nemas it frequently happens that the structure of important organs, especially those of the mouth and alimentary canal, is greatly simplified through degeneration. This degeneration proves to be relatively as marked among the parasitic nemas as it is among parasitic species in other phyla containing both free-living and parasitic forms, so that from the standpoint of comparative morphology, they are often very highly perplexing. On the other hand, it is already possible, through comparative study of the known free-living genera, to begin formulating some of the principal features of the orders and classes of nemas and to do it with sufficient truth and clarity to make the results useful to investigators, teachers and students.

The following table outlines a classification of the phylum, based on a study of several hundred genera. It is a comprehensive classification I have long employed, that has proved useful in many ways. It sets forth relationships based on and correlated with the mouth-parts. In most animal phyla where there is a distinct mouth, oesophagus and stomach, experience has amply proved the utility of these portions of the anatomy as a guide to phylogenetic relationships. While some parts of the following scheme appear to outline clearly and permanently certain fundamental truths, other parts undoubtedly will have to be expanded or altered,† since our knowledge of details is still inadequate to a clear view of all the larger relationships.

In the table, the order columns are staggered, in an attempt to indicate relative importance,—the farther to the left the words, the more comprehensive or significant is the meaning to be attached to the corresponding order name.

\* Waverly Press, July 19, 1919.

† Perhaps it may not be going too far to suggest that, in any such expansion and alteration, the aim be, among other things, to make the terminology of the phylum both euphonious and characteristic. Too few appear to realize how important it is that such a terminology be (1) As descriptive and as nearly self-explanatory as possible. (2) Few, short and consistent in its roots. (3) Simple and brief in its terms. (4) Characteristic and euphonious. (5) Such as lends itself readily to modern inflections and derivations.

Phylum *NEMATOS*  
(Nematoidea sensu restricto)

## Subphylum ALAIMIA\*

## Class Alaimia

*Anglicised*

## Subclass Manitinia

1. Order..... *Litinia*      Litinian forms; the Litinia

## Subclass Kinetinia

2. Order..... *Bolbinia*      Bolbinian forms; the Bolbinia

## Subphylum LAIMIA

## Class Anonchia

## Subclass Anodontia

3. Order..... *Cytolaimia*      Cytolaimian forms; the Cytolaims

4. Order..... *Isolaimia*      Isolaimian forms; the Isolaims

5. Order..... *Polylaimia*      Polylaimian forms; the Polylaims

## Subclass Odontia

6. Order..... *Apodontia*      Apodontian forms; the Apodonts

7. Order..... *Synodontia*      Synodontian forms; the Synodonts

## Class Onchia

## Subclass Homonchia

8. Order..... *Synonchia*      Synonchian forms; the Synonchs

9. Order..... *Mesonchia*      Mesonchian forms; the Mesonchs

10. Order..... *Aponchia*      Aponchian forms; the Aponchs

11. Order..... *Triplonchia*      Triplonchian forms; the Triplonchs

## Subclass Heteronchia

12. Order..... *Axonchia*      Axonchian forms; the Axonchs

13. Order..... *Anaxonchia*      Anaxonchian forms; the Anaxonchs

\*The names are the plurals of latinised Greek diminutives of the words, *'ω*, *λαίμωσ*, *'όγχωσ*, with descriptive prefixes.

## ALAIMIA

*Nemas without distinct pharynx*

Nemas devoid of pharynx may be conceived to be so either because they have never developed a pharynx or have evolved ("deteriorated") from forms having a pharynx. In the latter case, the group ALAIMIA may contain obscured equivalents of the subdivisions of the LAIMIA, the nemas with pharynx. It may therefore be possible to subdivide the ALAIMIA more fully after these forms, many of which are parasitic, have been further considered in their broad relationships. In this article only two subdivisions are suggested, of more or less superordinal rank, the *Litinia*, having a simple oesophagus without bulb or swelling, and the *Bolbinia*, having an oesophagus with a posterior or median swelling, or both.

## LAIMIA

*Nemas having a more or less distinct pharynx*

A distinction is here made among the mouth-parts of nemas, based on their origin, location and method of use. Sometimes these organs are labial, and sometimes they arise from elements deeper in the pharynx and more closely associated with the oesophagus proper. When arising by modification of the labial region they are here termed odontia,—singular odontium. The odontia are usually of smaller size than the second class of mouth-parts that arise from elements farther back and more closely associated with the oesophagus proper, and called onchs or onchia,—singular onchium. The odontia are seldom less than three in number, and may constitute a labial circlet of a dozen or more elements. The onchia are almost never more than three in number, and even then often only one of them is well developed.

According as they are characterized by the absence or presence of onchia, LAIMIA may be divided into two classes, the Anonchia and the Onchia. The Anonchia may in turn be divided into the subclasses Anodontia and Odontia, according as they lack or possess odontia. There are three anodontian orders, *Cytolaimia*, *Isolaimia* and *Poly-laimia*; and two odontian orders, *Apodontia* and *Synodontia*. Of these five orders, the first three are characterized by the pharynx being wholly unarmed, the pharynx of the cytolaims being a plain conoid, subspheroidal, or somewhat irregular cavity, the pharynx of the isolaims being mainly cylindroid or prismoid, i.e., parallel-sided, and the pharynx of the polyaims being more complex and composed of two or three successive chambers more or less distinctly separated from each other; while the latter two orders have a pharynx armed with odontia, the odontia of the *Apodontia* having an outward stroke, while those of the *Synodontia* have an inward stroke.

The second class of the LAIMIA, the Onchia, is characterized by a pharynx armed with onchia or with a spear composed of amalgamated onchia, and is divided into two subclasses, the Homonchia and the Heteronchia, differentiated from each other by the fact that in the homonchs the onchia are similar to each other and symmetrically arranged and nearly always three in number, while the heteronchs are characterized by asymmetrical onchia, the number of which may be reduced to one. There are four orders of homonchs and two of heteronchs. The four homonchian orders are the *Synonchia*, in which the onchia, nearly always three in number and of equal size, have an inward stroke; the *Mesonchia*, composed of forms intermediate between

the aponchs and the synonchs, and having three usually equal onchia, movable in a direction parallel to the body axis; the *Aponchia*, in which the onchia, separate and nearly always three or six in number, have an outward stroke; and the *Triplonchia*, having a spear composed of three more or less equal, slender onchial elements which have become amalgamated. The heteronchian orders are, *Axonchia*, having a single axial onchium or spear, and the *Anaxonchia*, in which the main onchium is not axial and may or may not be accompanied by one or two others, usually of smaller size.

Onchia and odontia seem more or less mutually exclusive, but the presence of one does not necessarily exclude the presence of the other. When both are present, experience appears to indicate clearly that the onchia are the more advantageously used as a guide to broad relationships.

In a later publication the proposed orders will be further defined by describing new type genera. In the meantime, the following table gives a tentative assignment of a few known genera, for explanatory purposes only. Reference to families composing the orders is omitted, because it appears to me after studying a very large number of undescribed species in addition to those described, that a number of the families that have from time to time been proposed may have to be recast.

Order	Genus	Order	Genus
LITINIA.....	<i>Bastiana</i>	SYNONCHIA.....	<i>Enoplus</i>
BOLBINIA.....	<i>Laxus</i>	MESONCHIA.....	<i>Fimbrilla</i> (?)
CYTOLAIMIA...	<i>Monhystera</i>	APONCHIA.....	<i>Chromadorella</i>
ISOLAIMIA.....	<i>Rhabdolaimus</i>	TRIPLONCHIA.....	<i>Tylenchus</i>
POLYLAIMIA...	<i>Bathylaimus</i> , <i>Plectus</i>	AXONCHIA.....	<i>Dorylaimus</i>
APODONTIA....	<i>Axonolaimus</i>	ANAXONCHIA.....	<i>Oncholaimus</i>
SYNODONTIA..	<i>Teratocephalus</i>		

The above linear tabular arrangements of the orders do not bring out fully the natural relationships of the different groups. These relationships will be discussed more fully later.

While the nomenclature here proposed is dominated by a few linguistic roots, it of course by no means follows that in assigning genera to the orders designated, due attention should not be given to other portions of the anatomy than those indicated by the nomenclature. This is a commonplace of taxonomy. The relationships of an organism are fully disclosed only on consideration of all its parts, and undue weight given to a particular feature will here, as elsewhere, result in confusion.